A.7 SWIFT GUEST INVESTIGATOR – CYCLE 2

1. Scope of Program

1.1 Overview

This Guest Investigator (GI) program solicits proposals for basic research relevant to the Swift gamma-ray burst mission. The primary goal of this mission is to determine the origin of gamma-ray bursts (GRBs) and use these bursts to probe the early universe. This Cycle 2 of the Swift GI Program is expected to begin ~16 months after launch and last approximately 12 months.

The Swift GI program is open only to scientists at U.S. institutions; similar GI programs may be sponsored in the United Kingdom and Italy. Consistent with Explorer Program policy, there will be no proprietary data rights to observations conducted on Swift. All science data will be made freely available on the World Wide Web as soon as possible.

The GI program is intended to provide the following benefits to participating scientists:

- Funding to carry out investigations using Swift data to conduct correlative observations at other wavelengths and to carry out theoretical investigations in support of Swift observations; and
- Involvement with the Swift science team in the analysis and interpretation of GRB data obtained with the observatory.

Finally, note that to enable the NASA Office of Space Science to properly evaluate the relevance of proposals submitted to its programs, as well as track its progress towards achieving its goals as mandated by the Government Performance Review Act (GPRA), all research supported by NASA's programs must now demonstrate its relationship to NASA Goals and Research Focus Areas (RFAs) as stated in the latest version of its Strategic Plan (follow links from the Web site http://spacescience.nasa.gov/); see also the discussion in Section I of the *Summary of Solicitation* of this NRA. Therefore, all proposers to this program element are asked to state their perception of this relevance in terms of the Goals, Science Objectives, and RFAs given in Table 1 found in the *Summary of Solicitation*. In particular, this program element is designed to help fulfill any of the RFAs for all of the Science Objectives for Goal II of both the science theme "Astronomical Search for Origins" and "Structure and Evolution of the Universe. " The appropriate place for this statement of relevancy is in the introduction to the proposal's "Scientific/Technical/Management" section (see Section 2.3.5 in the *NASA Guidebook for Proposers*). The index numbers in this table may be used to identify a specific RFA, for example, "Goal I, Sun-Earth Connection Theme, RFA 1(c)" or "Goal II, Astronomical Search for Origins, RFA 3(b)."

1.2 The Swift Mission

Swift is a Medium Class Explorer (MIDEX) mission under development at the NASA Goddard Space Flight Center (GSFC). The lead domestic partners include Pennsylvania State University and the spacecraft contractor, Spectrum Astro. There is significant international participation by groups in the United Kingdom and Italy. The mission is currently scheduled for launch in mid 2004. The Swift spacecraft carries three science instruments: a wide-field gamma-ray Burst Alert Telescope (BAT) and two sensitive, coaligned narrow-field instruments – the X-ray Telescope (XRT) and UV Optical Telescope (UVOT). The spacecraft can be autonomously repositioned to direct the XRT and UVOT toward events detected by the BAT. The BAT is a wide-field gamma-ray imager that will detect GRBs and rapidly send positions of arc minute accuracy to the spacecraft and to the ground. The BAT operates in the 15-150 keV range and has a
1.4 steradian (half-coded) field of view. It will have a GRB detection sensitivity that is ~2-5 times (depending upon the burst position in the field-of-view) better than the Burst and Transient Source Experiment (BATSE) that flew on the Compton Gamma-Ray Observatory (CGRO). In addition to detecting GRBs, the BAT will perform a survey of the hard x-ray sky to a sensitivity of ~1 mCrab (2×10^{-11} erg cm^{-2} s^{-1}). It will also scan most of the sky each 90-minute orbit and serve as a sensitive monitor for high-energy transients. Positions and spectra of transients detected by BAT will be telemetered to the ground and distributed immediately to the community.

In response to GRB alerts from the BAT, the spacecraft will reorient on a time scale of ~1 minute to point the XRT and UVOT instruments at a GRB or other transient. These instruments will perform multiwavelength measurements of the bright early afterglow (and also later-time afterglow) emission to provide sub-arc second positions, precise photometry and fine spectroscopy. The XRT is a Wolter 1 grazing incidence telescope which operates in the 0.2-10 keV band and has a field-of-view of 24 arc minutes with an angular resolution of 18 arc seconds and positional determination accuracy of 5 arc seconds. The detector is a cooled CCD, providing spectroscopy with a resolution
$E/\Delta E$ ~10 at 1 keV and an effective area of 110 cm^2. The UVOT is a Ritchey-Chrétien folded-optics telescope operating in the 170-650 nm band. It has a field-of-view of
17 arc minutes, with an angular resolution of 0.9 arc seconds and positional determination accuracy of 0.3 arc seconds. UVOT will provide a sensitivity of 24th magnitude for a 1000 second integration and has six filters for color photometry and two grisms for fine spectroscopy ($E/\Delta E \sim 300$) of sources brighter than 17th magnitude. The narrow-field instruments will produce an optical finding chart and X-ray spectra of the afterglow within a few minutes of the burst. This information will be distributed immediately over the Internet. Data from continued observations of the afterglow will be made available on a public Web site. Data from serendipitous sources in the fields-of-view of both instruments will routinely be sent to the ground for analysis.

Swift will be launched into a low Earth orbit with an inclination of 22 degrees and an altitude of 600 km. The baseline mission duration is two years, with possible extension beyond this initial

period depending upon the continued scientific productivity of the mission. The orbital lifetime of the satellite is expected to be approximately 8 years.

1.3 Types of Proposals

The Swift science team core science program is organized by Key Projects that cover both GRB and non-GRB topics. These projects represent investigations directed toward addressing the science goals discussed in the original Swift MIDEX proposal. Each Key Project has a small number of Swift science team members assigned to it. A compilation of the Swift Key Projects is provided at http://swiftsc.gsfc.nasa.gov/docs/swift/proposals/swift_keyprojects.html. This Cycle 2 Swift GI program (during mission years 2 and 3) solicits proposals in the following areas:

- New GRB projects not duplicative of team key projects and not requiring GI-specified observatory pointings;
- Correlative observations of GRBs with non-Swift instruments and observatories; and
- Theoretical investigations that will advance the mission science return in the area of GRBs.

In Cycle 2, GIs may propose to initiate their own new GRB projects, avoiding duplication of existing efforts while supplementing the Swift science return with their unique facilities and capabilities. Proposers should address how their activities will complement the Swift science team core science program. The extent to which the proposed research will enhance the science return from Swift and the demands placed upon mission resources by an investigation will be considered in the proposal evaluation process (see Section 2.2 below).

It is anticipated that correlative observations will substantially augment the science return from Swift. The Swift instruments will make breakthrough measurements of GRB afterglows starting immediately following the burst. However, it will not be possible to follow up all GRBs on all time scales since viewing constraints and scheduling conflicts will preclude some Swift observations. Also, the onboard capability, although significant, does not cover all of the scientifically valuable measurements that need to made. Candidate correlative observations that will add significantly to the Swift science include radio imaging and photometry, infrared spectroscopy (for high z bursts redshifted out of the band pass of the UVOT), deep optical imaging and spectroscopy (relative to the UVOT 24th magnitude limit) of the afterglow and possible host galaxy, deep X-ray imaging and spectroscopy, and rapid optical observations with time scales shorter than the 1-minute Swift response time.

Finally, theoretical studies related to the observations conducted with Swift hold the potential to significantly enhance the scientific impact of the mission. Accordingly, GI proposals for theoretical investigations are solicited during Cycle 2 with the requirement that they specifically address how the anticipated results will advance the mission GRB science objectives.

It is anticipated that the Swift GI program may be expanded in the future to include areas of research in non-GRB science and possibly allow GI-specified pointings. Note that proposals for non-GRB research are not currently solicited under Cycle 2. Depending upon the experience gained during Cycle 1, the above restrictions may be relaxed and prospective

investigators will be notified. In any event, investigators seeking support for such research may submit their proposal to the Astrophysics Data Analysis Program (ADAP) discussed in Section A.2 of this NRA.

2. Programmatic Information

2.1 General Information

It is anticipated that approximately $1M will be available through this solicitation for the support of approximately 30 Cycle 2 Guest Investigations of one year duration each. The Swift Cycle 2 GI program is open to all individuals employed at U.S. institutions (including Swift science team members). Scientists participating in the Swift mission, including Associate Scientists and members of the Follow-up Team who are not funded by the Project are eligible for support under this Cycle 2 GI program. Swift science team members already receiving support from the Project are also eligible for support during Cycle 2, although such individuals must provide a compelling justification for the award of additional funds under the GI program. Finally, pending the submission of proposals of merit, it is the intent of this program that at least half of the available GI funding be awarded to scientists not already formally associated with Swift.

2.2 Proposal Submission and Evaluation

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement – 2004* (or *NASA Guidebook for Proposers* for short) that is accessible by opening URL http://research.hq.nasa.gov/, and linking through the menu item "Helpful References," or may be directly accessed online at URL http://www.hq.nasa.gov/office/procurement/nraguidebook.

2.2.1 Submission of Proposals to the Swift Cycle 2 GI Program

In order to expedite the proposal review process and the timely selection of scientific peer review panels, investigators intending to submit proposals for participation in this program are asked to submit a Notice of Intent (NOI) to propose by the deadline to the Web address given in this NRA's *Summary of Solicitation*. Note that a NOI submission is not required but is of considerable value in helping NASA plan for an expeditious peer review of proposals.

Prospective proposers to the Swift Cycle 2 GI Program must adhere to the following procedures for the submission of proposals:

- **Electronically submit a *Cover Page/Proposal Summary/Budget Summary*** in compliance with Chapter 2.2 of the *Guidebook for Proposers* at the Web site http://proposals.hq.nasa.gov. Print and retain the *Cover Page*.
- **Prepare and submit 12 printed copies of the proposal to the address given in the Summary of Solicitation by the Due Date** for this program element (see Table 3 in the *Summary of Solicitation* for this NRA). The PI must sign the printed *Cover Page* and attach it as the front of the original of the proposal; copies of the signed *Cover Page* must be attached to the other 11 copies of the proposal.
- **Due to the nature of prospective investigations within the Swift GI program, the Scientific/Technical/Management section of proposals is limited to 4 pages, instead of the default 15 pages specified in the *Guidebook*, and the budget section is limited to 2 pages. The requirement of a table of contents in the body of the proposal is waived.**

Note: All printed and electronic proposal materials must arrive at the above address by the Due Date for this program given in Table 3 of the *Summary of Solicitation* to this NRA in order to be included in the proposal review for this cycle of the Swift Guest Investigator program.

2.2.2 Evaluation of Proposals submitted to the Swift Cycle 2 GI Program

Proposals will be evaluated by a peer evaluation panel with respect to the criteria specified in Section C.3 of the *Guidebook*, where it is understood that the intrinsic merit of a proposal shall include the following factors:

- The suitability of using the Swift observatory and data products for the proposed investigation;
- The extent to which the investigation complements approved Key Projects and enhances the anticipated science return from the mission in the area of GRB research;
- The degree to which the proposed investigation places demands upon mission resources; and
- For theoretical investigations, the degree to which the investigation directly advances the mission GRB science goals.

2.3 Supplemental Information

Further details of the proposal submission requirements and process may be found at the Swift Science Center Web site http://swiftsc.gsfc.nasa.gov/, which includes a detailed mission description; technical information about the Swift mission, instruments, and feasibility; information regarding proposal submission; and instructions for completing the required proposal forms.

Technical questions concerning this program element may be directed to the Swift Science Center:

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Programmatic information may be obtained from the Swift Program Scientist:

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